Hyperprism™

Real Time Sound Effects Processing Software

Manual Addendum

Arboretum

SYSTEMS

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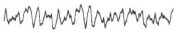
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This document corresponds to Version 1.5 of the software.

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Table of Contents

1. What's New in Hyperprism 1.5 ? 6

2. Installation of Hyperprism 1.5 and MIDI Utilities 8

3. Using Hyperprism with MIDI 17

What is MIDI ? 17
General Theory of MIDI Mapping 20
Controlling Hyperprism with an External MIDI Device 22
Controlling Hyperprism with Another MIDI Application 24
Using Hyperprism with both MIDI Devices and Other Applications 27

4. Description of New Hyperprism Processes 28
More Stereo 28
Hyper Stereo 30
Quasi Stereo 35
M-S Matrix 36
Stereo Tremolo 44
Crossing Pan 46
Sweeping Pan 50
Hyper Pan 53

1

What's New in Hyperprism™ 1.5 ?

I am sure the time will come when the composer, after he has graphically realized his score, will see this score automatically put on a machine which will faithfully transmit the musical content to the listener. ...The new notation will probably be seismographic.

Edgard Varèse (1936)

Welcome to Hyperprism 1.5 – a highly flexible real-time effects processor program for Apple Macintosh computers. Conceived for musical sound transformation, Hyperprism combines the ease of the Macintosh interface with the signal processing power of Digidesign sound cards.

Version 1.5 is a major advance. It adds these features:

- Eight new spatializer processes: More Stereo, Hyper Stereo, Quasi Stereo, M-S Matrix, Stereo Tremolo, Crossing Pan, Sweeping Pan, Hyper Pan. These effects are competitive with stand-alone spatializer products costing several times the price of Hyperprism. They offer a gamut of functions including mono-to-stereo conversion, stereo

image widening, M-S (mid-side) spatial decoding, surround sound field positioning, and radical transformations that simultaneously pan, phase invert, and filter the input sound according to curves you draw on the screen.

- MIDI control. This means that you can set fixed positions or trace gestures in the Blue Window plane from any MIDI source, not just the mouse. MIDI sources include physical devices such as keyboards, foot pedals, and sliders, or software sources such as sequencers and music programming languages.

- Hyperprism functions in real-time in the background, as you work with other applications in the foreground, be they MIDI applications or any other.

- User interface enhancements. (1) A Record button in the Playback palette triggers effects processing set to default values without clicking in the Blue Window. (2) Arrow keys can be used to nudge the position of the tracer by one pixel in any direction; Option-Arrow nudges by ten pixels.

- Hyperprism Consoles™ — a set of alternative graphic interfaces to Hyperprism. The Consoles feature faders, buttons, timers, numerical displays, and a musical keyboard, specialized for audio engineering and compositional applications.

Be sure to read the Read Me file on your Hyperprism 1.5 software diskette for important additional information we were not able to include in this manual.

2

Installation of Hyperprism 1.5 and MIDI Utilities

Installation of the Hyperprism 1.5 Application

The installation procedure for this version of Hyperprism depends on two factors:

Do you already have a previous version of Hyperprism installed?

Do you want to use either the MIDI control features or the Hyperprism Consoles?

Follow the instructions below that correspond to your situation.

Case 1. If you do NOT have a previous version of Hyperprism installed on your system:

First, refer to Appendix A of your Hyperprism Manual for detailed instructions on installing and configuring the Hyperprism application. The procedure for installing the new version is the same.

☞ If you intend to use MIDI control or the Hyperprism Consoles, return to this chapter after you have installed the application. Read the section on Installation of MIDI Utilities.

☞ If you do not intend to use MIDI control or the Hyperprism Consoles, you are done installing after you've replaced the old version with the new one. It is not necessary to install the MIDI utilities. Hyperprism 1.5 works under keyboard and mouse control just like the previous version. Skip to Chapter 4 to read about the new effects in this version.

Case 2. If you have a previous version of Hyperprism installed on your system:

☞ There is no need to authorize or deauthorize from the key disk. Simply drag the old Hyperprism 1.1 icon into the trash and replace it with the new version 1.5. Your key disk for version 1.1 works with version 1.5; your installation count remains the same.

☞ If you want to use MIDI control or the Hyperprism Consoles, read the next section on Installation of MIDI Utilities.

☞ If you do not intend to use MIDI control or the Hyperprism Consoles, you are done installing after you've replaced the

old version with the new one. Hyperprism 1.5 works under keyboard and mouse control just like the previous version. Skip to Chapter 4 to read about the new effects in this version. It is necessary to install the MIDI utilities only if you intend to use MIDI control.

Installation of the MIDI utilities

The Hyperprism 1.5 software includes a diskette with MIDI utilities that allow the Macintosh to receive and transmit MIDI messages and to pass these messages between MIDI applications. The Hyperprism Consoles are driven by MIDI data; thus you must install the MIDI utilities if you intend to use the Consoles.

Choosing Your MIDI Utilities

There is no single standard set of MIDI utilities for the Macintosh. A variety of utilities coexist, and certain applications work only with specific utilities. Hyperprism 1.5 offers a choice of two MIDI utilities packages: the Apple MIDI Manager (AMM, version 2.01 or above), or the Opcode MIDI System (OMS, version 1.2 or above). You have the choice of installing one or both of these packages, although only one can be used at a time.

Digidesign products are OMS-compatible. OMS has better performance and is probably the most widely used MIDI utility. However, OMS version 1.2.3 by itself normally does not allow communication between different MIDI

applications running at the same time. It supports communication only between a single application and MIDI hardware devices. This would prohibit the use of Hyperprism with a sequencer, for example.

When version 2.0 of OMS is released, these restrictions should not apply. In the meantime, one can add the OMS IAC (Inter Application Communication) Driver supplied with your Hyperprism 1.5 package (the icon is shown below). This driver allows one MIDI application to communicate with another.

AMM is not as well accepted as OMS by the community of users. Because AMM is slower than OMS, you may notice that Hyperprism's tracking of MIDI input is more sluggish. But AMM has the advantage of being directly compatible with either applications or devices.

A third option is to install both AMM and OMS, in the case that you have applications that need one or the other at different times. If, however, you start an application that uses AMM, you cannot start another application that uses OMS at the same time. Fortunately, there is no need to deinstall the one not being used.

If you have no other applications that require AMM, we recommend that you install only OMS. However, if you intend to use the Hyperprism Consoles or a sequencer to control Hyperprism, you will need to install the OMS IAC Driver as well.

In the next sections we present three options: OMS, AMM, and both OMS and AMM. Skip to the section that

corresponds to your desired configuration.

MIDI Device Configuration with OMS

If OMS 1.2.1 or above is already installed, go to item 4 in the following list. Otherwise go to item 1.

1. Insert the Hyperprism Utilities disk and open the OMS Install folder.

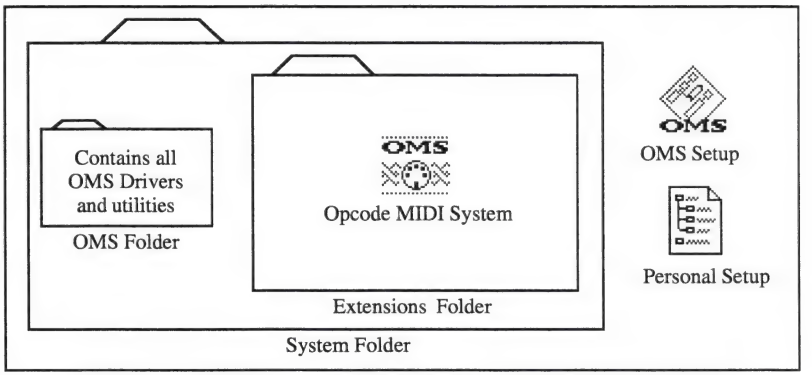
2. Double-click on the OMS Installer icon and follow the steps indicated by this program.

3. After you quit the Installer, your Macintosh will restart. Note that the OMS Setup application is now present at the top level of your directory. The Opcode MIDI System file is in the Extensions folder.

4. Insert the Hyperprism Utilities diskette and drag the OMS IAC Driver to the OMS Folder in your System folder.

OMS IAC Driver

Your configuration should look like this:



OMS Setup

OMS Setup lets you configure the connection between MIDI hardware devices in your studio. Double-click on the OMS Setup application. This will help you create or update a studio setup document, which describes your MIDI setup.

You must create (or update) a studio setup document before you use Hyperprism with OMS. After you launch OMS Setup, you have the option of creating a new setup file or updating an old one. If you have never set up an OMS configuration select New Studio Setup in the File menu. If you already have a setup, select Open... in the File menu and choose the setup you would like to update.

If you want to create a new setup, you have two options: Minimal Studio Setup and Custom Studio Setup. If you have a simple MIDI configuration, you may be able to use the first option; otherwise you'll need to customize your setup. Your configuration is "simple" if you have a minimum MIDI interface box that supports 16 channels. If you have a multiport interface box that supports more than 16 channels you'll need to customize your setup document.

For more details on configuring OMS for your studio, see the Opcode MIDI System (OMS) User Manual.
The OMS User Manual is available from Opcode Customer Service, telephone: (415) 856-3333.

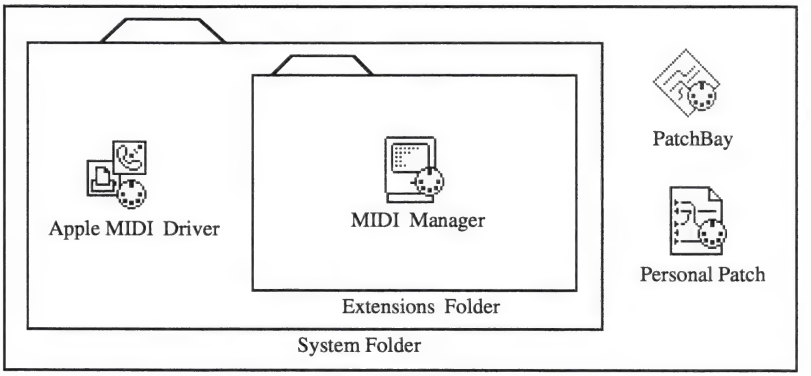
MIDI Device Configuration with AMM

1. Insert the Hyperprism Utilities disk and open the AMM Installation Folder.

2. Drag the Apple MIDI Driver and MIDI Manager into your System folder. The Apple MIDI Driver will stay loose in your System folder while the MIDI Manager driver will automatically go into the Extension folder.

3. Copy the PatchBay application icon onto your hard disk.

Your configuration should look like this:



AMM Setup

To set up your MIDI network, use the PatchBay application, which is typically installed in the Apple Menu Items folder along with PatchBay Help. See the help windows supplied with PatchBay for more information on its use. As you'll see in Chapter 3, PatchBay also lets you connect software applications to Hyperprism.

Installing Both OMS and AMM

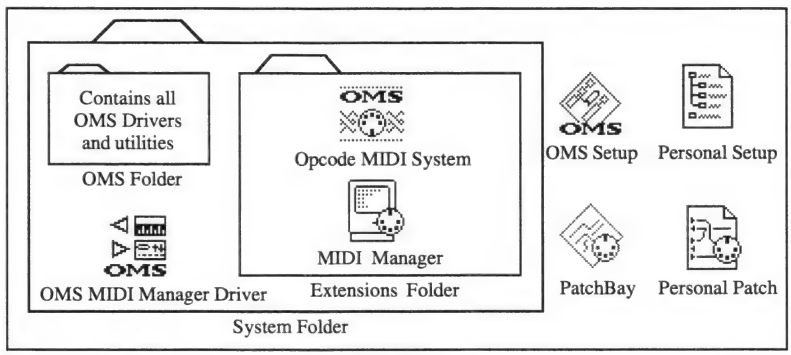
In some cases it is necessary to have both OMS and AMM, since different MIDI appplications require one or the other. OMS and AMM can both reside on a system, but you can only use one at a time.

1. Follow the procedures above describing the installation of OMS and AMM.

2. On your Hyperprism Utilities diskette, locate the file named OMS MIDI Manager Driver in the OMS Folder

☞ This file must replace the file named Apple MIDI Driver in your System folder.

Your configuration should now look like this:



Set up each MIDI utility as described in their respective setup sections above.

The rest of this manual assumes you know the basics of operating Hyperprism. Study the Hyperprism Manual before continuing on in this Manual Addendum.

3

Using Hyperprism with MIDI

Adding MIDI capability to Hyperprism means that effects can be piloted from any MIDI source. You can control effects by manipulating devices such as MIDI sliders, footpedals, musical keyboards, and pitch wheels. It also means you can control Hyperprism from other MIDI programs such as sequencers or any music language that generates MIDI messages. Thanks to MIDI, gestures made with a MIDI device can be recorded by a sequencer and later edited.

If you're using the Hyperprism Consoles, the MIDI mapping described in this chapter does not apply. Refer to the Hyperprism Consoles Read Me file.

What is MIDI?

This section contains a basic introduction to MIDI. If you are already familiar with MIDI, skip to the section General

Theory of MIDI Mapping.

The Musical Instrument Digital Interface or MIDI protocol has been described as an interconnection scheme between instruments and computers, a set of guidelines for transferring data from one instrument to another, and a language for transmitting musical scores between computers and synthesizers. All these definitions capture an aspect of MIDI.

The MIDI specification stipulates a hardware interconnection scheme and a method for data communications. To paraphrase one music technologist, there is nothing specific to music about MIDI. MIDI is a means of transmitting information about key presses, potentiometer settings, knob turnings, and joystick manipulations. This is precisely the kind of information we are interested in tracking for the control of Hyperprism effects.

MIDI also specifies a formal grammar for encoding musical performance information. Performance information is packaged into small messages sent from one device to another. For example, a message can specify the start and stop time of a musical note, its pitch, and its initial amplitude. Hyperprism can handle such messages, but since it is not a synthesizer, it interprets such messages in its own way, as explained later. Other messages like "Select a new patch now," or "Increase the parameter controlled by slider no. 1 now" can be more directly interpreted by a Hyperprism effect.

The MIDI protocol includes a provision for 16 distinct

channels of information. Separating messages by channel means that each channel is independent: a command to change a parameter value that is sent on channel 1 does not affect the device connected to channel 2. This means that each parameter of a Hyperprism effect can receive its messages via a separate channel.

Some aspects of music change in a discrete on/off way, like the keys on a keyboard or the pushbuttons on the control panel of a synthesizer. Other aspects change in a continuous way over time, for example, the overall amplitude controlled by a footpedal, or the amount of vibrato with a modulation wheel. MIDI controllers usually have both discrete (e.g., switches or keys) and continuous controllers (e.g., levers, wheels, potentiometers, pedals).

Hyperprism receives both discrete and continuous messages. For example, the Playback palette buttons are discrete functions, while the tracer's X and Y positions are continuous functions.

The changes generated by discrete controllers result in individual messages like note-on, note-off, and program change. For continuous changes, MIDI sends control change messages. Control change messages tell a receiving device that the position of a continuous controller is changing. The input device transmits a new three-byte message every time a continuous controller changes–as fast as it can when the controller is constantly varying.

Each type of controller is defined by a number in the MIDI regime. For example, controller 1 is the modulation wheel on

a synthesizer, 2 is the breath controller, 4 is a foot pedal, 7 is the volume controller, 10 is the pan controller, 38 is a data entry slider, and so on. Some devices such as "universal" MIDI controllers let you specify which controller numbers you wish to use for a particular button or fader. Read more about the controller numbers appropriate to your device in that device's documentation.

☞ The stream of messages from a continuous controller can consume a great deal of MIDI's available transmission capacity.

General Theory of MIDI Mapping

Hyperprism's effects can be piloted from any MIDI source. This means you can control effects by manipulating devices such as MIDI sliders, footpedals, musical keyboards, and pitch wheels. It also means you can control effects from a MIDI sequencer.

In order to make use of this capability, you have to connect commands associated with a Blue Window to sources of MIDI control messages. Setting up this connection is called mapping in the parlance of MIDI. Hyperprism makes MIDI mapping easy.

☞ First select the MIDI Enable item in the Setup Menu. A check mark will appear indicating that Hyperprism is ready to receive MIDI messages.

To set up your MIDI map, select MIDI Mapping under the Setup menu. This opens a window that displays a table with

several rows. Each row corresponds to a Hyperprism command:

Play:	Play a sound or a previously drawn curve in the Blue Window; the choice is determined by the Listening Mode controls in the Playback palette
Record:	Record a trace in the Blue Window
Stop:	Stop playing or recording
Pause:	Interrupt playing or recording
Loop:	Play or record repeatedly
Horizontal:	Change the position of the tracer on the horizontal axis of a Blue Window
Vertical:	Change the position of the tracer on the vertical axis of a Blue Window
New Effect:	Select another effect
Select Window:	Select one of the windows listed in the Views menu; the number corresponds to the order in the list

To map a MIDI device to a Hyperprism control parameter, click on the command name on the left. Then, using your MIDI source, generate a MIDI message using the controller you would like to map to that Hyperprism command. Hyperprism automatically determines the source, type, and channel and displays them in the Mapping column.

For example, the Play command is selected by default. Simply actuate any MIDI controller and see how the message name is displayed in the Mapping column.

When no parameter is selected the Mapping column displays "(None)."

To remove a mapping in a row, select the MIDI command and hit the delete key.

☞ When you Quit Hyperprism the current mapping will be saved in the Hyperprism Preference file, located in the Preference folder in the System folder.

Controlling Hyperprism with an External MIDI Device

➠ First make sure that the device is correctly set up using PatchBay or OMS Setup, depending on the MIDI driver you are using.

➠ Start Hyperprism.

➠ Select MIDI Mapping from the Setup menu.

➠ The first Hyperprism command selected is Play. To select another command, simply click on its name. For example, if the only functions you want to control via MIDI are the horizontal and vertical positions of the tracer, select Horizontal. When you're done setting up the Horizontal axis, select Vertical.

With a Hyperprism command selected, actuate a controller on the external MIDI device. For example, to map a continuous controller to the Horizontal command, slide a fader, move a joystick, or push down on a foot pedal. Notice how the source of the message is displayed in the Mapping column.

Click on the OK button in the MIDI Setup window to establish the mapping. From now on, whenever you use that controller, the Horizontal position of the tracer follows your gesture. Verify this in the Blue Window.

Controlling the Position of the Tracer from a Musical Keyboard

You can control the X-Y position of the tracer using only discrete note messages played on a musical keyboard. Hyperprism decodes both the note number and the key velocity to position the tracer.

In the MIDI Setup window select Horizontal and press any key on a musical keyboard. The Mapping column indicates a note message has been sent. This makes the Horizontal position change according to what note you play.

Select Vertical and press any key on a musical keyboard. The Mapping column indicates a note message has been sent and now the span of the keyboard is mapped to the Horizontal dimension.

Now press the key again. Notice that the mapping window indicates that a velocity message has been sent. This makes the Vertical position change according to how fast you press the keys. Hyperprism switches between note and velocity

reception when you press notes in the MIDI Mapping window.

The discrete "on/off" Hyperprism commands such as those in the Playback palette are best controlled by correspondingly discrete messages, such as individual notes or foot switches, rather than by continuous controllers such as sliders and foot pedals.

Controlling Hyperprism with Another MIDI Application

First start the MIDI "master" application that you would like to control Hyperprism. Here we will assume that it is a sequencer or any other MIDI application. The MIDI application can run in either the background or the foreground.

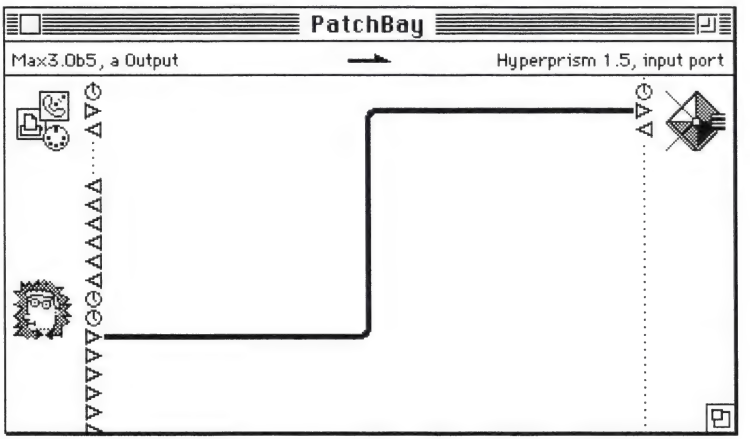
Start Hyperprism.

Make sure that the program is correctly connected to the input of Hyperprism.

Depending on which MIDI driver you are using, consult the appropriate section, AMM or OMS below.

AMM

If you are using AMM, you connect the output of the master application to Hyperprism via the PatchBay application.



AMM setup for control of Hyperprism by Max™

Select MIDI Mapping from Hyperprism's Setup menu. By default, the first Hyperprism command selected is Play. To select another command, simply click on its name. For example, if the only functions you want to control via MIDI are the horizontal and vertical positions of the tracer, select Horizontal. When you're done setting up the Horizontal axis, select Vertical.

Prepare the MIDI application so that it will generate the type of MIDI message you want to map. Sequencers can generate many types of data, including notes, continuous controller data, and program changes. Open up one of the sequencer's editor windows, enter some data in the window, and click on

the Play button in the sequencer to generate a message of the desired type.

Notice how the source of the message is displayed in the Mapping column of the MIDI Setup window.

Click on the OK button in the MIDI Setup window to establish the mapping. From now on, whenever the sequencer generates that type of message, the Horizontal position of the tracer follows its command. Verify this in the Blue Window.

OMS

If the IAC Driver is installed in your OMS folder and is visible in your OMS Setup, the communication from MIDI applications to Hyperprism 1.5 should be transparent. That is, OMS Setup does not display application names. Thus you do not need to route the output from one application to the input of another like you do in Patchbay. This communication happens invisibly when you open up OMS-compatible applications alongside Hyperprism. For best performance we recommend that you launch just one MIDI "master" program, be it Hyperprism Consoles, or a sequencer.

Using Hyperprism with Both MIDI Devices and Other Applications

Sometimes you may want to use Hyperprism with both external devices and another MIDI application. One useful configuration is to control Hyperprism with a MIDI fader box while recording the MIDI data from the fader box into a sequencer. Later you can edit this data using the sequencer's editing facilities and replay the edited control functions into Hyperprism.

Setting up the mapping between the external device and Hyperprism is the same as explained above. The only trick in this technique is to make sure that the MIDI output of the external device is routed to both the sequencer and Hyperprism. You can set this up using either Patchbay or OMS Setup, depending on the MIDI driver you are using.

Hyperprism Consoles

The Hyperprism Consoles are a set of graphical interfaces in a standalone application specially designed to be used in conjunction with Hyperprism. Refer to the Hyperprism Consoles Read Me file to learn how to use them. Most Consoles have an online Help text to get you started.

4

Description of New Hyperprism Processes

Hyperprism 1.5 adds eight new spatializer effects to the twenty-one effects found in the original version: More Stereo, Hyper Stereo, Quasi Stereo, MS Matrix, Stereo Tremolo, Crossing Pan, Sweeping Pan, Hyper Pan. These techniques are designed to enhance sound projection and positioning using two loudspeakers or headphones.

More Stereo

More Stereo alters the stereo effect by widening or narrowing the spatial image–without changing the overall volume. It simultaneously applies a variable-cutoff highpass filter to either the mono or the stereo part of the signal.

Parameters

Horizontal position:

Width of the stereo image, where 0 means mono, 100 means normal stereo (no change to the input). 200 doubles the proportion of the discrete channel information in the output by attenuating the common or mono part of the signal, and 300 triples it. A horizontal value greater than 100 has the effect of widening the stereo image, pushing the sound to the extreme lateral poles.

For an even more extreme discrete stereo separation effect (up to 800% more stereo), see the description of the Hyper Stereo process later. However Hyper Stereo requires you to adjust the gain manually, while More Stereo delivers constant gain at all image widths.

Vertical position:

Cutoff frequency for a 12 dB per octave highpass filter. At the bottom of the Blue Window (a value of 0) the effect is switched off. As you raise the position of the tracer, a highpass filter attenuates low frequencies in the range up to 6000 Hz.

This filter applies only to the processed part of the signal. That is, at a horizontal position of 100% (normal stereo), it has no effect. As you move the tracer to the left the filter applies only to the mono signal. As you move it to the right, the filter applies only to the stereo part of the signal.

Example

Create a new Hyperprism document for a stereo file from your library of sounds. Play it and then select More Stereo in the Processes menu.

Click on Loop.

Move the tracer from left (0) to right (300). At the leftmost position, the output is monaural, with the contributions from both channels mixed and sent to both outputs. In the center position (100) the stereo sound file is played back unchanged. In the extreme right position (300) the stereo image widens to the left and right, with less sound in the middle.

Limitations

More Stereo has no effect on mono input signals. It treats only the discrete stereo part of the signal (that part of the signal that is not common to both channels).

Hyper Stereo

Hyper Stereo is one of Hyperprism's most versatile effects.

Parameters

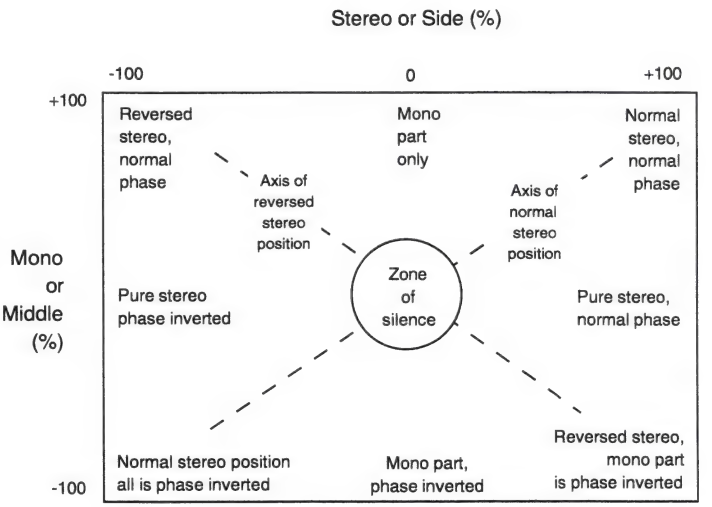
Horizontal position:

Stereo or Side: the proportion of discrete stereo in the output. This parameter varies from -100% to +100%. Negative values are channel-reversed, that is, left is right and right is left.

Vertical position:

The proportion of common or mono signal in the output. This parameter varies from -100% to +100%. Negative

values are phase-inverted. That is, the positive part of the waveform is reflected into the negative and vice-versa.



Hyper Stereo parameter space

Hyper Stereo has many applications, as shown in the Hyper Stereo parameter space diagram above.

1. Isolating the mono part of a stereo signal (the part that is common to two channels).

Position the tracer exactly in the center top.

2. Isolating the pure discrete stereo part of a stereo signal (the part that is unique to each channel).

Position the tracer exactly in the center on the right side.

3. Reversing the stereo image (putting the left channel in the right output and the right channel in the left output).

Position the tracer exactly in the top left corner.

4. Stereo phase inversion (the positive part of the left and right waveforms are flipped into the negative and vice-versa).

Position the tracer exactly in the bottom left corner.

5. Mono phase inversion (the positive part of the mono waveform is flipped into the negative and vice-versa)

Position the tracer exactly in the bottom center.

5. Stereo reversal and phase inversion

Position the tracer exactly in the bottom right corner.

6. Extreme widening of the stereo image, beyond that possible in More Stereo.

400% more stereo. Position the tracer exactly at the right (+100% horizontal) and down to +25% on the vertical scale. You have thereby increased the proportion of the stereo part of the signal relative to the mono part, widening the image by 400%. Increase the output level with the faders palette by 12 dB to compensate for the loss in gain.

800% more stereo. Position the tracer exactly at the right (+100% horizontal) and down to +12% on the vertical scale. Increase the output level with the faders palette by 18 dB to compensate for the loss in gain.

CAUTION: since the 400% and 800% more stereo effects require that you increase the output level, remember to reset the output level to 0 with the faders palette before playing other sounds.

Both More Stereo and Hyper Stereo widen the spatial image. More Stereo widens the image by up to 300%. Hyper Stereo widens by up to 800% but requires you to adjust the gain manually. The advantage of the More Stereo effect is constant gain across all widths that it handles.

7. Continuous panning between any of these effects over time, creating unusual spatial projections.

Tracer motion from the left to the right at the top reverses the left and right channels on a continuous basis while leaving the mono part of the input signal in the middle. With a single mono input this motion functions like a pan pot on a mixing console, avoiding the "hole in the middle" effect.

8. M-S decoding. The M-S recording technique is well-known to recording engineers as a flexible means of creating a variety of spatial images from a stereo recording session. See the section on M-S decoding with Hyper Stereo later.

Hyper Stereo makes it possible to separate the discrete stereo part of a signal from the mono part of a signal and process them independently. This enables an entirely new category of sound transformations using Hyperprism's multipass processing. First create a new output file that represents only the discrete stereo part of an input signal. Afterwards, create another file that represents only the mono part of the input signal. Then process each part separately using other

Hyperprism effects. Finally, combine the two parts by sound file mixing.

M-S Decoding with Hyper Stereo

M-S refers to either Mid-Side or Mono-Stereo. This classic stereo recording technique has the advantage that one can change the apparent width of the stereo image after the recording session, using a device called an M-S decoder. Hyperprism 1.5 offers an effect called M-S Matrix that performs this task, but you can also perform it with Hyper Stereo. For a description of the theory of M-S recording, see the description of the M-S Matrix effect.

Here's how to perform M-S decoding with Hyper Stereo.

Select Hyper Stereo from the Processes menu. A Blue Window appears.

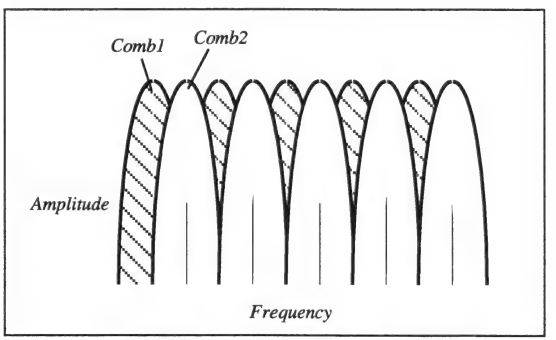
Select M-S in the Settings menu. This configures Hyperprism for M-S decoding.

Position the tracer at the top center of the Blue Window. As you slide the tracer towards the right, the stereo image widens, just as if you were readjusting the position of two directional microphones during a recording session.

For pure M-S processing, use only the horizontal dimension. You might want to rescale the vertical dimension to +100 at both the top and bottom to nullify the effect of vertical motions. (The Hyperprism Consoles include a fader-based interface for control of M-S decoding.)

Quasi Stereo

Quasi Stereo accepts a monaural input signal and produces a pseudostereo two-channel output. It divides the mono signal path and applies complementary comb filters to each channel. These filters disperse their outputs to the left and right output channels in such a way as to create a strong sense of a broad stereo image.



Complementary comb filters in Quasi Stereo

Parameters

↔ Horizontal position:

Width of the stereo image, where 0 means mono (the input is routed to both outputs with no change), +100 means 100% pseudostereo.

↕ Vertical position:

Cutoff frequency for a 12 dB per octave highpass filter. At the bottom of the Blue Window (a value of 0) the effect is switched off. As you raise the position of the tracer, a

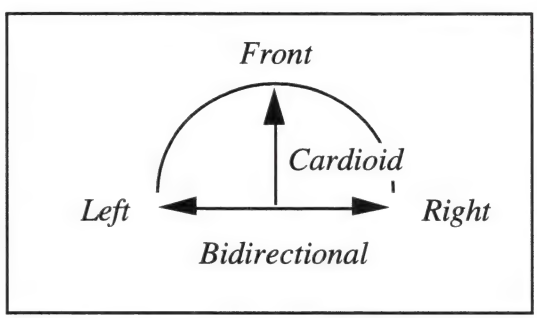
highpass filter attenuates low frequencies up to 6000 Hz.

☞ For an interesting spatial effect, apply Quasi Stereo to a two-channel stereo input signal. The effect acts on only the mono (common) part of the signal. The discrete stereo channel information is added to the processed pseudostereo signals to form the output.

M-S Matrix

M-S refers to either Mid-Side or Mono-Stereo. This classic stereo recording technique has the advantage that one can change the apparent width of the stereo image after the recording session, using a device called an M-S decoder. In the past, an M-S decoder took the form of an external analog circuit. The M-S Matrix effect replaces this circuit, making experimentation with the M-S technique as easy as tracing a line in the Blue Window. The description below tells you how to use Hyperprism's M-S decoding facilities.

The Hyperprism Consoles include an alternative interface for M-S decoding.



M-S microphone configuration

Theory of M-S Recording

In order to perform M-S decoding you first need to make M-S encoded recordings. This requires two microphones. One of these microphones faces front, toward the audio source. Its polar pattern is usually cardioid. (A variation on the M-S technique uses an omnidirectional microphone in the center for a more directional pattern.) The other microphone is bidirectional (also called figure-eight). The cardioid microphone captures the middle or mono part of the stereo image. The bidirectional microphone picks up the sides or discrete stereo part of the image. You record the output of these microphones on a two-channel recorder, with one channel called M and the other S, as opposed to the usual left (L) and right (R).

Assuming you have made an M-S recording, connect the M output of your recorder to Channel 1 of your Digidesign system, and connect the S to Channel 2.

Parameters

↔ Horizontal position:

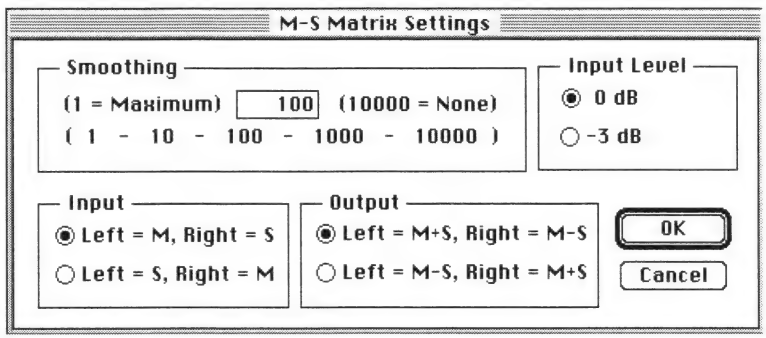
Displacement of the stereo image in degrees [-90, +90], where the center position 0° means no change. This can be useful in processing sound tracks recorded on location where the dialog is off-center, and one wants to restore it to the center position.

☞ This parameter maintains constant power at any position, so that at extreme left or right positions the level is boosted. If this causes distortion you can compensate by lowering the input level by 3 dB in the Settings window.

Vertical position:

Side level in dB, from +6 to -96 dB. The gives you control over the level of the stereo part of the signal. In M-S processing, the higher the stereo level, the wider the apparent stereo image.

Settings



Settings Dialog for M-S Matrix

Smoothing, as in other Hyperprism processes, determines the speed of update from the mouse to a Hyperprism process. More smoothing means that jerky mouse movements are transformed into more continuously-varying curves.

Input

Middle Left and Side Left. By default M-S Matrix assumes that the signal going into the "Left" input jack is the Mid part of the M-S signal. By selecting Left = Side, the program assumes that the left input is the Side part of the M-S signal.

Output

These buttons can correct for an out-of-phase microphone

configuration. They determine the phase of the M source. M+S in Left is the normal case; the M input sums positively.

Input Level
No change (0) or a 3 dB reduction in input level. The M-S Matrix effect operates on a constant-power basis. In order to keep a constant power level, the signal is boosted by 3 dB at the extreme left and right positions (to compensate for the other channel dropping out). Thus in general the 3 dB reduction will be needed only at an extreme left or right position, if at all.

Operation of M-S Matrix

Example

Select New and open the file Clifden Beach, Ireland. This is an M-S encoded file. Select Loop in the Playback palette.

Select M-S Matrix from the Processes menu.
According to the sound engineer who made this recording, the normal stereo effect is rendered when the tracer is clicked at position 0,-30. Do this and listen to the sound for a while. Now release the mouse button, position the tracer just below that position, hold the shift key and click again. You will be tracing a vertical line. If you trace toward the bottom you'll hear the sound gradually becoming mono.

If you trace above -30 you'll hear the sound image becoming wider and wider.

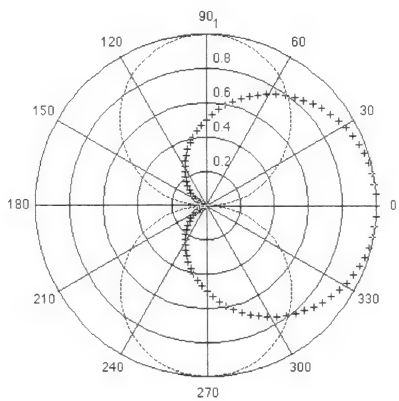
Position the tracer at the top center of the Blue Window. As you slide the tracer towards the right, the apparent "center" of the stereo image shifts to the right, just as if you were

readjusting the position of the M microphone during a recording session.

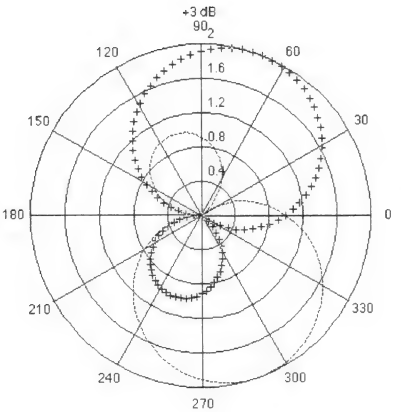
Position the tracer at the top center of the Blue Window. As you slide the tracer towards the left, the apparent "center" of the stereo image shifts to the left, just as if you were readjusting the position of the M microphone during a recording session.

Spatial Patterns Obtainable with M-S Decoding

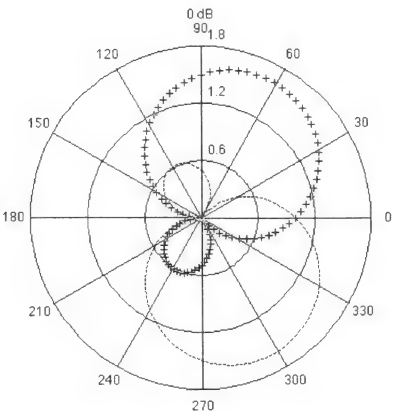
The polar diagrams below show the range of spatial patterns obtainable from a single M-S recording using M-S Matrix and Hyper Stereo. The captions list the X and Y positions of the tracers followed by a figure in decibels that indicates the level of the S part of the signal relative to the M part.



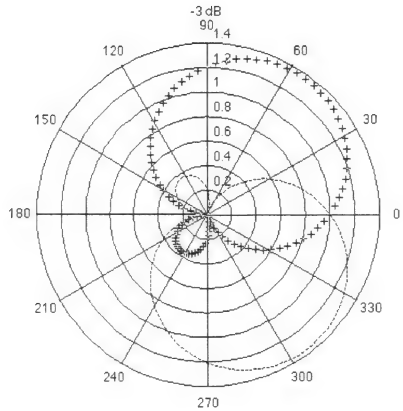
Directivity patterns for a bi-directional (--) and cardiod (++) microphone in M-S recording configuration. This reflects the physical configuration of the microphones in the original recording session.



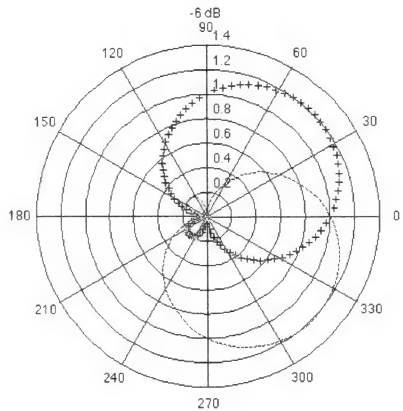
Hyper Stereo: Stereo +100%, Mono 50%, M-S Matrix: pattern at +3 dB



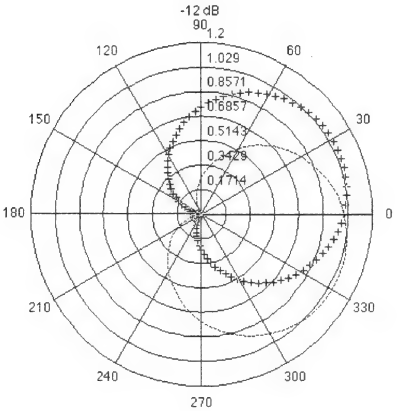
Hyper Stereo: Stereo +100%, Mono +100%, M-S Matrix: pattern at O dB (equal level)



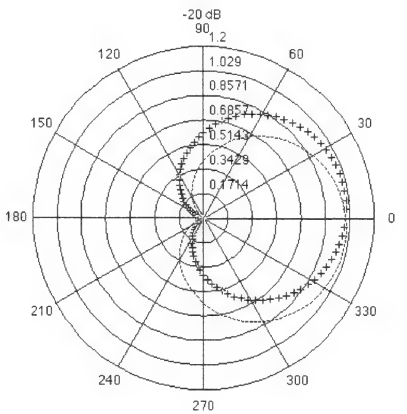
Hyper Stereo: Stereo +71%, Mono +100%, M-S Matrix: pattern at -3 dB



Hyper Stereo: Stereo +50%, Mono +100%, M-S Matrix: pattern at -6 dB



Hyper Stereo: Stereo +25%, Mono +100%, M-S Matrix: pattern at - 12 dB



Hyper Stereo: Stereo +10%, Mono +100%, M-S Matrix: pattern at -20 dB

☞ M-S Matrix has no effect on mono input signals but interesting effects can be obtained on some "normal" stereo signals.

Stereo Tremolo

Stereo Tremolo implements a two-channel amplitude modulation effect that is not to be confused with panning. That is, for a stereo input signal, the left signal remains in the left output channel and the right signal remains in the right output channel. Only their amplitudes change over time, creating the illusion of a signal crisscrossing in space. By manipulating the parameters and the settings, you have a wide variety of controls over this effect.

Parameters

↔ Horizontal position:

Speed of modulation in Hertz, from -4 to 4 by default. (The maximum is -10 to 10.) A negative value changes the direction of the initial transition. For a positive value the signal energy appears first in the right channel. For a negative value it appears in the left channel. Hyperprism displays integer values for this parameter, but—as in all Hyperprism effects—the internal resolution of this parameter is much finer than the values displayed. (See "Parameter Resolution Tradeoffs" in the Hyperprism Manual.)

↕ Vertical position:

Depth of tremolo modulation; variation as a percentage of the total output, by default from 0 to 100%.

Settings

X-Fade
Linear or Constant Power crossfade. A linear crossfade (the default setting) passes from one channel to the other in a linear manner. A constant power cross fade applies a sinusoidal transition function. This has the effect of keeping the power constant as the signal appears to shift from one side to the other. (A linear crossfade tends to leave an apparent "hole" in the center as the energy shifts from one side to the other.)

Right Phase Inversion
Inverts the phase of the right channel output. For certain sounds this enhances the effect.

Modulation Type
Triangle, Sine, Square. This control selects the type of tremolo function, corresponding to three common waveform functions.

The Symmetry control acts like a "duty cycle" knob on an analog synthesizer, squeezing the selected waveform to one side or another. For example with a symmetry of 50% (the default), the time spent in the left and right channels is the same. A symmetry value of 0% favors the left channel, while a value of 100% favors the right channel. 33% and 66% produce interesting rhythmic patterns.

Smoothing
As in other Hyperprism processes, this determines the speed of update from the mouse to a Hyperprism process. More

smoothing means that jerky mouse movements are transformed into more continuously-varying curves.

Example

Create a new Hyperprism document for the file Bell provided with your Hyperprism package. Play it and select the Stereo Tremolo process.

Click in the Blue Window near the top, and position the tracer just off center. This sets the speed of modulation at less than 1 Hz. (As mentioned previously, the actual frequency resolution is much finer than the displayed resolution.)

Listen as the tremolo oscillates between the two channels. In the Playback mode palette toggle between Original and Processed.
Change the settings and listen to their effects on the sound.

Crossing Pan

Crossing Pan causes the discrete stereo channel information to pan to the opposite channel and back at a rate set in the Blue Window. That is, the left and right channels pass each other as they cross to the opposite channel and back.

Parameters

↔ Horizontal position:

Speed of pan modulation in Hertz, from -4 to 4 by default. (The maximum is -10 to 10.) A negative value changes the

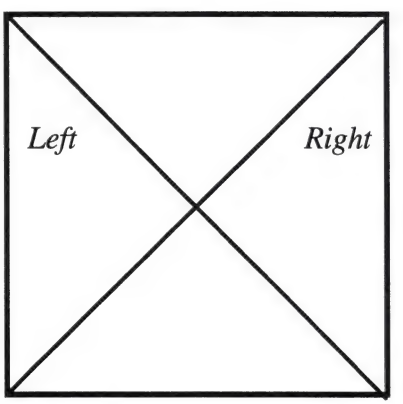
direction of the initial transition. For a positive value the signal energy appears first in the right channel. For a negative value it appears in the left channel. Hyperprism displays integer values for this parameter, but—as in all Hyperprism effects—the internal resolution of this parameter is much finer than the integer values displayed. (See "Parameter Resolution Tradeoffs" in the Hyperprism Manual.)

Vertical position:

Depth of panning modulation; variation as a percentage of the total output, by default from 0 to 100%.

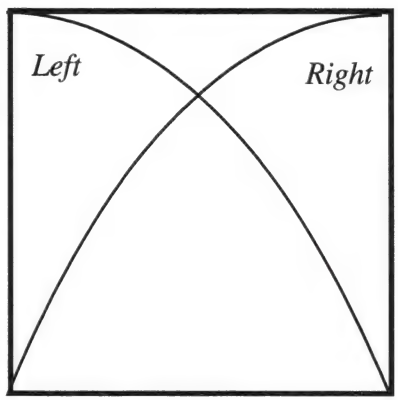
Settings

X-Fade
Linear or Constant Power crossfade. A linear crossfade (the default setting) passes from one channel to the other in a linear manner.



Linear crossfade

A constant power cross fade applies a sinusoidal transition function. This has the effect of keeping the power constant as the signal appears to shift from one side to the other. (A linear crossfade tends to leave an apparent "hole" in the center as the energy shifts from one side to the other.)



Constant power (cosine/sine) crossfade

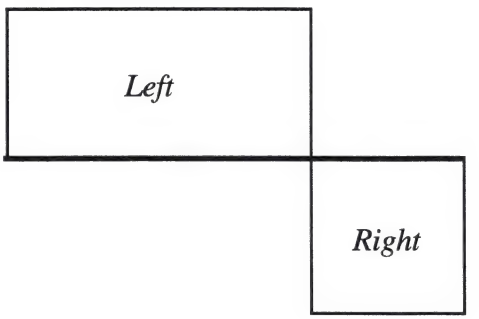
Right Phase Inversion
Inverts the phase of the right channel output. For certain sounds this enhances the spatial effect.

Modulation Type
Triangle, Sine, Square. This control selects the type of tremolo function, corresponding to three common waveform functions.

The Symmetry control acts like a “duty cycle” knob on an analog synthesizer, squeezing the selected waveform to one side or another. For example with a symmetry of 50% (the

default), the time spent in the left and right channels is the same. A symmetry value of 0% favors the left channel, while a value of 100% favors the right channel.

33% symmetry for a square wave panning function



Smoothing

As in other Hyperprism processes, this determines the speed of update from the mouse to a Hyperprism process. More smoothing means that jerky mouse movements are transformed into more continuously-varying curves.

Example

Create a new Hyperprism document for the file Clifden Beach, Ireland. Play it and select the Crossing Pan process.

In Loop mode, click in the Blue Window near the top, and position the tracer just off center. This sets the speed of modulation at less than 1 Hz. (As mentioned previously, the actual frequency resolution is much finer than the displayed resolution.)

Listen as the waves oscillate between the two channels. Change the settings and listen to their effects on the sound.

Limitations

Crossing Pan has no effect on a mono input sound because it only treats the stereo (discrete channel) part of the input signal.

Sweeping Pan

Sweeping Pan is a dramatic spatial effect. As you elevate the vertical position of the tracer it combines the left and right channel information into a mono signal that sweeps from side to side.

Parameters

Horizontal position:

Speed of pan modulation in Hertz, from -4 to 4 by default. (The maximum is -10 to 10.) A negative value changes the direction of the initial transition. For a positive value the signal energy appears first in the right channel. For a negative value it appears in the left channel. Hyperprism displays integer values for this parameter, but—as in all Hyperprism effects—the internal resolution of this parameter is much finer than the integer values displayed. (See "Parameter Resolution Tradeoffs" in the Hyperprism Manual.)

Vertical position:

Depth of panning modulation; variation as a percentage of the total output, by default from 0 to 100%.

Settings

X-Fade
Linear or Constant Power crossfade. A linear crossfade (the default setting) passes from one channel to the other in a linear manner. A constant power cross fade applies a sinusoidal transition function. This has the effect of keeping the power constant as the signal appears to shift from one side to the other. (A linear crossfade tends to leave an apparent "hole" in the center as the energy shifts from one side to the other.)

Phase
Inverts the phase of the right channel output. For certain sounds this enhances the effect.

Modulation Type
Triangle, Sine, Square. This control selects the type of tremolo function, corresponding to three common waveform functions.

The Symmetry control acts like a "duty cycle" knob on an analog synthesizer, squeezing the selected waveform to one side or another. For example with a symmetry of 50% (the default), the time spent in the left and right channels is the same. A symmetry value of 0% favors the left channel, while a value of 100% favors the right channel.

Smoothing
As in other Hyperprism processes, this determines the speed of update from the mouse to a Hyperprism process. More smoothing means that jerky mouse movements are transformed into more continuously-varying curves.

Example

Create a new Hyperprism document for the file Clifden Beach, Ireland. Play it and select the Sweeping Pan process.

In Loop mode, click in the Blue Window near the top, and position the tracer just off center. This sets the speed of modulation at less than 1 Hz. (As mentioned previously, the actual frequency resolution is much finer than the displayed resolution.)

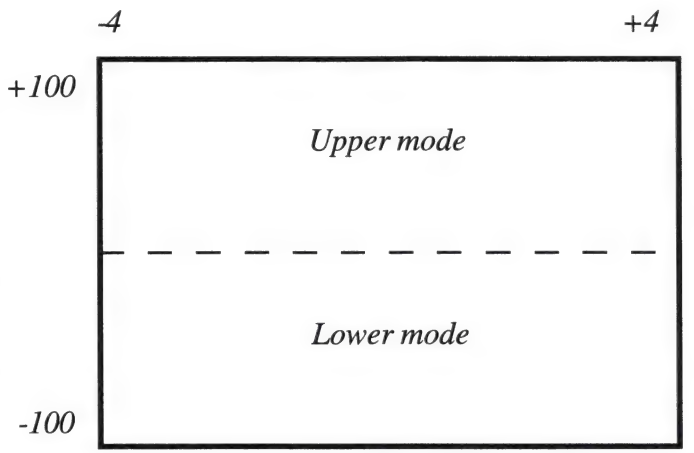
Listen as the waves oscillate between the two channels. Change the settings and listen to their effects on the sound.

Limitations

Sweeping Pan has no effect on a mono input sound because it only treats the stereo (discrete channel) part of the input signal.

Hyper Pan

Hyper Pan is a powerful dual spatializer that implements two spatial panning effects. You can slide continuously from one to the other using the vertical dimension of the Blue Window. One effect is controlled in the upper (positive) half of the window, and the other is controlled in the lower (negative) half.



Upper and lower mode regions of Hyper Pan

Parameters

↔ Horizontal position:

Speed of pan modulation in Hertz, from -4 to 4 by default. (The maximum is -10 to 10.) A negative value changes the direction of the initial transition. For a positive value the signal energy appears first in the right channel. For a negative value it appears in the left channel. Hyperprism displays integer values for this parameter, but—as in all Hyperprism effects—the internal resolution of this parameter

is much finer than the integer values displayed. (See "Parameter Resolution Tradeoffs" in the Hyperprism Manual.)

Vertical position:

Depth of panning modulation; variation as a percentage of the total output, by default from 100% to -100%. The positive half controls the Upper Mode effect; the negative half controls the Lower Mode Effect.

Settings

The settings divide into upper and lower mode controls.

Upper Mode

Choice of pan effect, between Stereo Tremolo, Crossing Pan, and Sweeping Pan.

Lower Mode

Choice of pan effect, between Stereo Tremolo, Crossing Pan, and Sweeping Pan.

X-Fade

Linear or Constant Power crossfade. A linear crossfade (the default setting) passes from one channel to the other in a linear manner. A constant power cross fade applies a sinusoidal transition function. This has the effect of keeping the power constant as the signal appears to shift from one side to the other. (A linear crossfade tends to leave an apparent "hole" in the center as the energy shifts from one side to the other.)

Phase
Inverts the phase of the right channel output. For certain sounds this enhances the effect.

Modulation Type
Triangle, Sine, Square. This control selects the type of tremolo function, corresponding to three common waveform functions.

The Symmetry control acts like a "duty cycle" knob on an analog synthesizer, squeezing the selected waveform to one side or another. For example with a symmetry of 50% (the default), the time spent in the left and right channels is the same. A symmetry value of 0% favors the left channel, while a value of 100% favors the right channel.

Smoothing
As in other Hyperprism processes, this determines the speed of update from the mouse to a Hyperprism process. More smoothing means that jerky mouse movements are transformed into more continuously-varying curves.

Example

Create a new Hyperprism document for the file Clifden Beach, Ireland. Play it and select the Hyper Pan process.

Select Settings... under the Processes menu and ensure that the Upper Mode and Lower Mode effects are different.

In Loop mode, click in the Blue Window near the top, and position the tracer just off center. This sets the speed of modulation at less than 1 Hz. (As mentioned previously, the actual frequency resolution is much finer than the displayed resolution.)

Listen as the waves oscillate between the two channels. Change the settings and listen to their effects on the sound. Move the cursor between the upper mode and lower mode regions of the window and listen to the difference in the panning effect.

To accentuate the contrast between the upper and lower modes, click on the phase inversion button for one of the effects.

Limitations

Hyper Pan's spatializers have no effect on a mono input sound because they treat only the stereo (discrete channel) part of the input signal.

Index

AMM 10
Apple MIDI Manager 10
bidirectional microphone 36
cardioid microphone 36
Clifden Beach, Ireland 39
Constant Power crossfade 37
control change messages 19
controller numbers 20
Crossing Pan 46
Custom Studio Setup 14
Depth of panning 46
Digidesign™ sound cards 6
duty cycle 45
Hyper Pan 53
Hyper Stereo 30
Hyperprism Consoles 7,27
IAC 11
installation 8
linear crossfade 47
lower mode 53
M-S decoding 36
M-S decoding with Hyper Stereo 34
M-S Matrix 36
M-S processing 34
Mid-Side 5,34,36
MIDI 17
MIDI channel 19
MIDI control 6

MIDI mapping 20
Minimal Studio Setup 14
More Stereo 28
Musical Instrument Digital Interface 17
note-on, note-off 19
omnidirectional microphone 37
OMS 10
OMS IAC Driver 11
OMS Setup 12
Opcode MIDI System 10
pan modulation 46
Parameter Resolution 44
PatchBay 14
PatchBay Help 15
phase 7,30,32
program change 19
pseudostereo 34
Quasi Stereo 34
Right Phase Inversion 44,48
smoothing 38
spatial patterns obtainable from a single M-S 40
Stereo Tremolo 44
Sweeping Pan 50
Symmetry control 44,48
tremolo function 44,48,50,54
upper mode 53
Varèse 6
X-Fade 44,46,50,54

Notes

Hyperprism™ *1.5*

UPGRADE KIT

Follow the simple steps below to copy your new software onto your hard disk.

YOU DO NOT NEED TO DEAUTHORIZE YOUR HYPERPRISM 1.1 SOFTWARE: YOUR CURRENT AUTHORIZATION FOR v.1.1 REMAINS VALID FOR v.1.5.

Insert Disk 1/2 of your Hyperprism 1.5 Upgrade Kit and launch the Installer. Even if you are already familiar with Hyperprism, we highly recommend that you proceed with a Standard Install (requires 3.5 Mb of free space on your hard disk).

When the installation is completed, you will not need to Restart your Mac. Simply launch the Hyperprism 1.5 application and fill in your name, company name (optional), and the serial number printed on your original Hyperprism 1.1 Master Key Disk. Always keep your disks in a safe place and never erase them.

You are ready to go ! Please read the *Hyperprism 1.5 Read Me* file for the basics and new features that this important upgrade brings you.

- Try the *Clifden Beach, Ireland* sound example as described in the Read Me file.
- Also try the Hyperprism Consoles™. See the *Read Me Consoles* file FIRST !

NOTE: Hyperprism Consoles is a freely distributed application which was developed using Max™.

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12/94